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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/673,265	11/29/2000	Ernst Eberlein	41000	3597

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EXAMINER	
GOSHTASBI, JAMSHID	

ART UNIT	PAPER NUMBER
2637	

DATE MAILED: 08/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/673,265	EBERLEIN ET AL.	
	Examiner	Art Unit	
	Jamshid Goshtasbi-G.	2637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 October 2000*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *23-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *23-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3 and 7*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 23-44 are pending in the application.

Claim Objections

1. Claim 38 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. **Claim 38** is improperly dependent on Claim 35 because the limitation recited in Claim 38 for determining the carrier frequency deviation contradicts (and not further limiting) the limitation recited in Claim 35.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 24, 27, 35 and 38-44 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contain(s) subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

As to **claims 24** and **35**, the derivation of the carrier frequency deviation in the

specification by forcing the argument of the magnitude squared of the transmitted AM sequence to zero (in Eq. 5, Page 13), as stated by the applicant, is not clear; further, this implies that the magnitude of the transmitted AM sequence is zero; but the magnitude of the transmitted AM sequence can not be zero unless there was no signal transmission of AM sequence.

As to **claims 27** and **38**, the derivation of the carrier frequency deviation in the specification by forcing the argument of the magnitude squared of the received sequence to zero (in Eq. 13, Page 15), as stated by the applicant, is not clear; further, this implies that the magnitude of received sequence is zero; but the magnitude of received sequence can not be zero unless there was no sequence received.

Claims 38-44 are also inherently rejected because they are dependent on the rejected base claim 35.

Claim Rejections – 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 23, 25, 29, 30, 32, 33, 34 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mori (US 5717722) in view of Huang et al. (US 6058101) and Muraishi (US 5936462).

As to **Claim 23**, Mori discloses a digital signal demodulation system (Fig. 8; col.

8, lines 51-53) for multi-carrier modulation (MCM) signals, where the system includes a frequency offset detection unit 116 and a frequency offset correction circuit 19, and that the received signal frame (Fig. 9) includes a predetermined reference symbol portion [pattern] with its reference amplitude waveform (envelopes) stored in a memory 119 in the demodulator (col. 16, lines 15-33; col. 19, lines 17-32); further, an amplitude detection unit 126 (Fig. 10) detects and generates amplitude waveforms (envelopes) of the received signal and sequentially outputs amplitude values to a correlation unit 127 that at a predetermined sampling period sequentially extracts the measurement amplitude waveform of the latest amplitude from the amplitude values sequentially received from the amplitude detection unit and sequentially calculates correlation values between the [predetermined] reference amplitude waveform [pattern] (corresponding to the predetermined sampling time; stored in the memory unit) and the sequentially extracted measurement amplitude waveforms; further, a synchronizing signal unit 128 detects the sampling time representing a maximum value of correlation values and generates a synchronous detection signal (d) that is sequentially used by a phase difference calculation unit 120 (that includes a second correlation unit) for calculating a phase difference that is sequentially used by an offset amount calculation unit 121 that determines a carrier frequency deviation (offset) that is sequentially used by the frequency offset correction circuit 19 (col. 19, line 34 – col. 20, line-14; Fig. 8); Mori, however, fails to teach down-converting of the received signal and sampling of the down converted signal to generate an envelope; neither does Mori teaches controlling of the oscillator frequency; however, Huang et al. discloses a

synchronization method and system for obtaining frame, carrier, and sampling synchronization of an input OFDM modulated digital signal (Abstract), where the synchronization system includes an envelope detector (generator) that receives the OFDM input signal (col. 5, lines 34-40), and where the fractional carrier frequency offset (deviation), estimated (Fig. 6; col. 8, line 14 – col.9, line 26) based on the introduction of the guard interval (col. 8, lines 40-41), is then compensated by an automatic frequency control (AFC) circuit [i.e., the oscillator frequency is controlled] whenever OFDM symbols occur (col. 9, lines 10-13); further, Huang et al. teaches that the conventional methods and systems for achieving carrier frequency synchronization first estimate the integral (coarse) frequency offset of the carrier frequency and then compensate for fractional frequency offset (col. 2, lines 31-34; col. 8, lines 1-5) in contrast with the disclosed method where the fine frequency offset is estimated first and then is used to obtain the coarse carrier frequency offset (col. 8, lines 5-13), and that in a typical carrier frequency synchronization process, an incoming OFDM signal is first detected and then the received signal is sampled and then correlated with a reference signal to achieve coarse synchronization (col. 2, lines 4-12); Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Huang et al. into the method of Mori for producing the claimed invention because incorporating the fine carrier frequency offset estimation method of Huang et al. in the offset frequency detection unit of Mori's method provides for amplitude detecting of a received signal (having a guard interval) and correlating the received signal with a predetermined (stored) reference symbol for fine carrier

frequency offset estimation that can be used in the frequency offset correction circuit (of Mori) for controlling (correcting) the oscillator frequency by and AFC (Huang et al.); further, Muraishi, teaches the design of an amplitude demodulator for an amplitude modulated signal where a received RF signal is down-converted to a frequency generated by a local oscillator, and then the envelope of the down-converted signal is generated (figures 1 and 9; col. 1, lines 17-24, col. 2, 17-29; col. 3, lines 58-61). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Muraishi into the method of Mori (in view of Huang et al.) for producing the claimed invention because using the amplitude demodulation of a down-converted (amplitude modulated) MCM signal provides a substitute for the amplitude detection unit of Mori where down-converting of the received signal is required.

As to **Claim 25**, the claimed method recites features that correspond with subject matter mentioned above in the rejection of claims 23 and are applicable hereto; further, Huang et al. teaches the introduction of a guard interval (Figs. 2 and 5), the duration of which being one-fourth of the duration of the useful symbol, and where the symbols in the guard interval are reproduced from the final one-fourth of the useful symbols (col. 7, lines 53-62), implying an OFDM signal with a reference symbol with two identical portions (two identical sequences); further, the guard intervals are used to estimate a fractional frequency offset of the carrier frequency offset that is then used to obtain the integral (coarse) frequency offset; further, the described relationship between the guard intervals and estimation of fractional frequency offset shows a

method and apparatus (Fig. 6; col. 8, line 11 – col. 9, line 26) wherein the input signal is delayed for the duration of the useful signal (in order to get a copy of the symbol in the guard interval; implies generating an envelope having two portions which are based on identical symbols (sequences)) and then correlated with itself (implies correlating a reference sequence (symbol) with a delayed copy of itself) to obtain an estimation of the carrier frequency offset.

Claim 29 inherits the limitations of Claim 23; further, the claimed method recites features (OFDM signal) that correspond with subject matter treated above in the rejection of Claim 23 and are applicable hereto.

Claim 30 inherits the limitations of Claim 23; further, Muraishi teaches that automated gain control (AGC) is performed on the down-converted amplitude modulated signal before envelope detection (amplitude demodulation); and that the high speed of digital communication systems requires a AGC with fast tracking capability to maintain the proper levels in the baseband signal. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings Muraishi into the method of Mori (in view of Huang et al.) for producing the claimed invention because performing a fast AGC of the down-converted signal prior to amplitude demodulation provides for maintaining the proper levels in the baseband signal.

Claim 32 inherits the limitations of Claim 23; further, the claimed method recites features (sampling of the received signal) that correspond with subject matter mentioned above in the rejection of Claim 23 and are applicable hereto.

Claim 33 inherits the limitations of Claim 23; further, the claimed method recites features (over sampling of the received signal) that correspond with subject matter mentioned above in the rejection of claims 23 and 32 and are applicable hereto; further, it is well known in the art that frequency at which the received signal is sampled must be high enough (at least twice the frequency of any of said sub-carriers for a time period; over sampled) that the phase and amplitude of all of the data-carrying sub-carriers can be determined.

As to **Claim 34**, the claimed apparatus recites features that correspond with subject matter mentioned above in the rejection of claims 23 and are applicable hereto.

As to **Claim 36**, the claimed apparatus recites features that correspond with subject matter mentioned above in the rejection of claims 23 and 25 and are applicable hereto.

Claim 40 inherits the limitations of claims 35/34; further, the claimed method recites features that correspond with subject matter treated above in the rejection of claims 23, 29, and 34 and are applicable hereto.

Claim 41 inherits the limitations of Claim 35/34; further, the claimed method recites features that correspond with subject matter treated above in the rejection of claims 23, 30, and 34 and are applicable hereto.

Claim 43 inherits the limitations of Claim 35/34; further, the claimed method recites features that correspond with subject matter treated above in the rejection of claims 23, 32, and 34 and are applicable hereto.

Claim 44 inherits the limitations of Claim 35/34; further, the claimed method

recites features that correspond with subject matter treated above in the rejection of claims 23, 33, and 34 and are applicable hereto.

6. Claims 31 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mori (US 571722) in view of Huang et al. (US 6058101) and Muraishi (US 5936462) as applied to claim 23 above, and further in view of Applicant's admitted prior art (page12, lines 18-23).

Claim 31, claimed method recites features (over sampling of the received signal) that correspond with subject matter mentioned above in the rejection of claims 23 and are applicable hereto; however, Mori, Huang et al., and Muraishi, all fail to teach the steps of calculating amplitude demodulation by $alpha_{max+}$ $beta_{min-}$ method; however, Applicant's admitted prior art discloses the use of $alpha_{max+}$ $beta_{min-}$ method in determining the amplitude of the received signal. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings Applicant's admitted prior art into the method of Mori (in view of Huang et al. and Muraishi) for producing the claimed invention because using amplitude demodulation by $alpha_{max+}$ $beta_{min-}$ method reduces the amplitude detection calculation by the detection unit.

Claim 42 inherits the limitations of Claim 35/34; further, the claimed method recites features that correspond with subject matter treated above in the rejection of claims 23, 31, and 34 and are applicable hereto.

Allowable Subject Matter

7. Claim 26, 28, 37 and 39 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusions

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Huang et al. [US 5991289], Mori [US 5745535], Keevill et a. [US 6359938B1] disclose and teach various methods and apparatus for estimation of carrier frequency offset (deviation) and synchronization. Leung et al. [US 5444697] all teaches the need for over sampling of the received OFDM signal in the receiver/demodulator.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jamshid Goshtasbi-G. whose telephone number is (703) 305-8976. The examiner can normally be reached on M-F 8:00/4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on (703) 308-7728. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR

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Jamshid Goshtasbi-G.
Examiner
Art Unit 2637

KHAI TRAN
PRIMARY EXAMINER